

National Aeronautics and
Space Administration



EXPLORE SCIENCE

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Deputy Associate Administrator
NASA Science

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NASA SCIENCE

AN INTEGRATED PROGRAM

Planetary
Science



Earth
Science



Joint Agency
Satellite Division



Astrophysics



Heliophysics



RESEARCH

~**10,000** U.S. Scientists Funded
~**3,000** Competitively Selected Awards
~**\$600M** Awarded Annually

TECHNOLOGY DEVELOPMENT

~**\$500M** Invested Annually

EARTH-BASED INVESTIGATIONS

20 Airborne Missions
8 Global Networks

SPACECRAFT

98 Missions
82 Spacecraft

Science by the NUMBERS

SMALLSATS/ CUBESATS

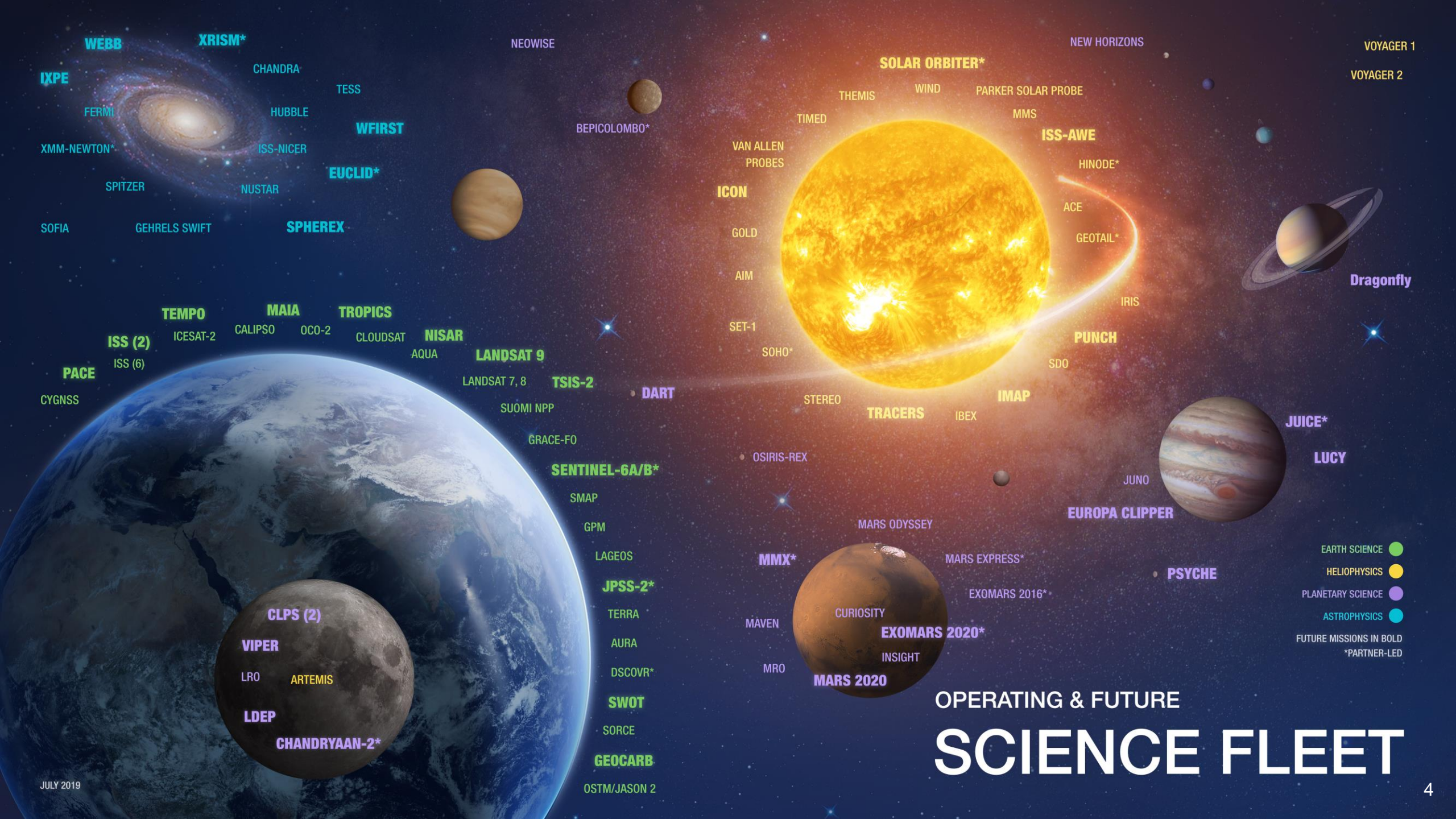
22 Science Missions
14 Technology Demos

SOUNDING ROCKETS

16 Science Missions
5 Tech/Student Missions

BALLOONS

10 Science Missions
4 Technology/Student



WEBB
XRISM*
IXPE
CHANDRA
TESS
FERMI
HUBBLE
WFIRST
XMM-NEWTON*
ISS-NICER
EUCLID*
SPITZER
NUSTAR
SOFIA
GEHRELS SWIFT
SPHEREX

TEMPO
MAIA
TROPICS
ISS (2)
ICESAT-2
PACE
ISS (6)
CALIPSO
OCO-2
CLOUDSAT
NISAR
AQUA

NEOWISE
BEPICOLOMBO*
LANDSAT 9
LANDSAT 7, 8
TSIS-2
DART
SUOMI NPP
GRACE-FO
SENTINEL-6A/B*
SMAP
GPM
LAGEOS
JPSS-2*
TERRA
AURA
DSCOVR*
SWOT
SORCE
GEOCARB
OSTM/JASON 2

SOLAR ORBITER*
THEMIS
WIND
PARKER SOLAR PROBE
MMS
ISS-AWE
HINODE*
ACE
GEOTAIL*
IRIS
PUNCH
SDO
IMAP
IBEX
TRACERS
STEREO
SOHO*
SET-1
AIM
GOLD
VAN ALLEN PROBES
TIMED
OSIRIS-REX
MAVEN
MRO
MARS 2020
EXOMARS 2020*
INSIGHT
CURIOSITY
MMX*
MARS ODYSSEY
MARS EXPRESS*
EXOMARS 2016*
PSYCHE

NEW HORIZONS
VOYAGER 1
VOYAGER 2
Dragonfly
JUICE*
LUCY
JUNO
EUROPA CLIPPER

CLPS (2)
VIPER
LRO
ARTEMIS
LDEP
CHANDRYAAN-2*

EARTH SCIENCE ●
HELIOPHYSICS ●
PLANETARY SCIENCE ●
ASTROPHYSICS ●
FUTURE MISSIONS IN BOLD
*PARTNER-LED

OPERATING & FUTURE SCIENCE FLEET



EXPLORATION



INNOVATION



EXCELLENCE



EXPLORATION

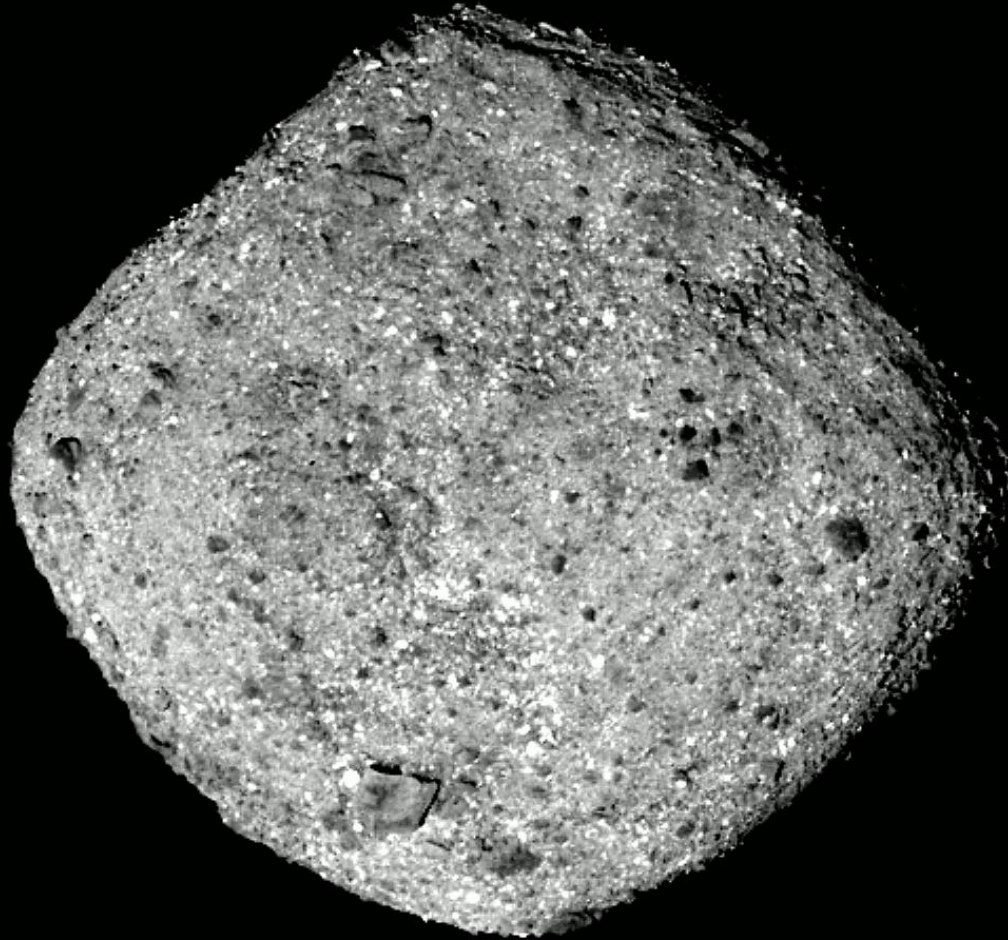


INNOVATION



EXCELLENCE

OSIRIS-REx



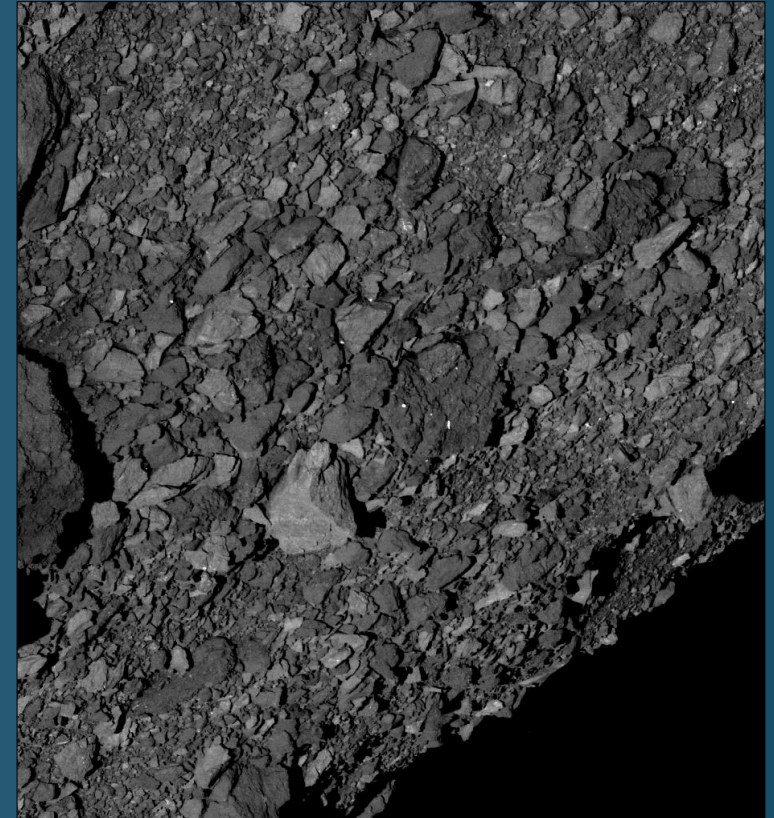
PI: Dante Lauretta

Institution: University of Arizona

Program: New Frontiers, > \$650 million



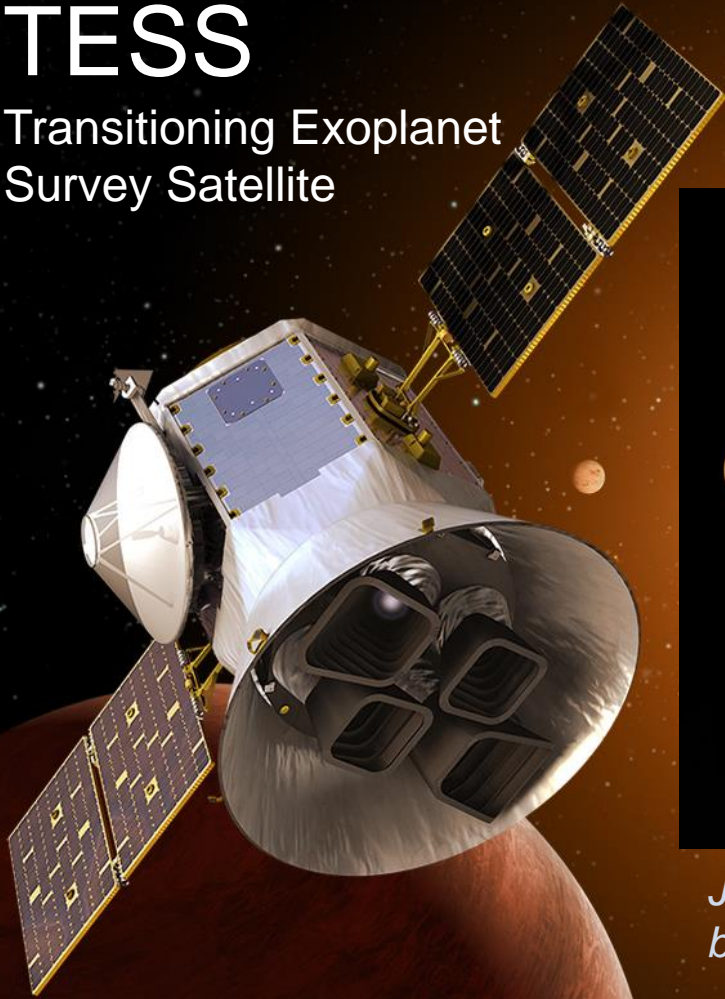
**SCIENCE
HIGHLIGHT**



Mar. 7, 2019 – OSIRIS-REx image shows a view across Bennu's southern hemisphere; demonstrates the number and distribution of boulders

TESS

Transitioning Exoplanet
Survey Satellite



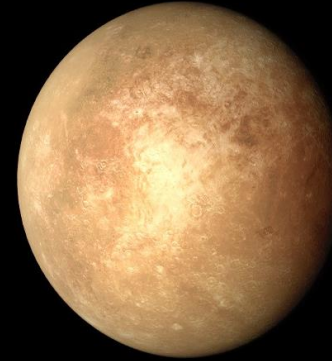
Mars



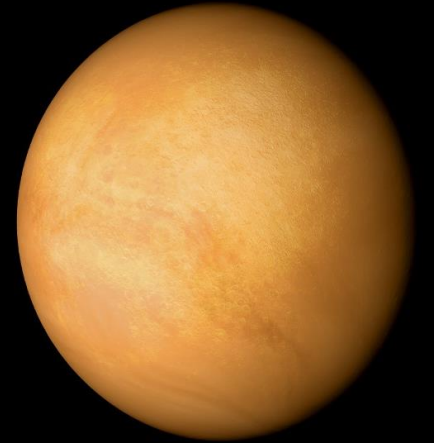
L 98-59b



Earth



L 98-59c



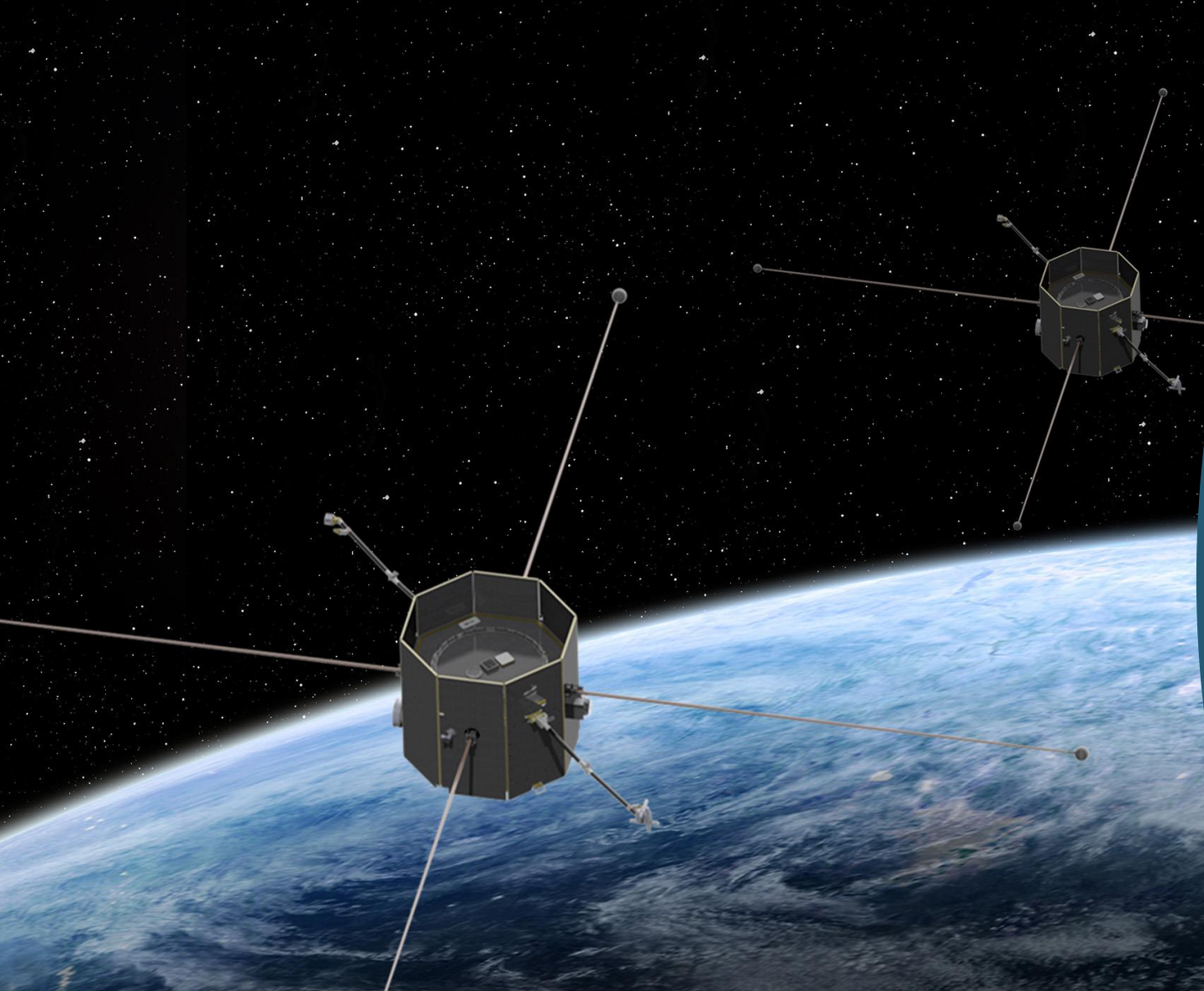
L 98-59d

June 27, 2019 – L 98-59b is the tiniest planet discovered by TESS to date, a world between the sizes of Mars and Earth orbiting a bright, cool, nearby star

PI: George Ricker

Institution: Massachusetts Institute of Technology

Program: Medium-Class Explorer (MIDEX), $\$250 \leq \650 million



SMEX SELECTION:

Tandem Reconnection and Cusp Electrodynamics Reconnaissance Satellites (TRACERS)

- TRACERS will launch as a secondary payload on the same rocket with PUNCH
- Will use two spacecraft, built by Millennium Space Systems, to study particles and fields at Earth's northern magnetic cusp region near the North Pole
- Magnetic cusp provides an opening for solar radiation to reach deep into atmosphere, particularly during violent geomagnetic storms triggered by outbursts from Sun
- PUNCH and TRACERS missions scheduled to launch by August 2022

PI: Craig Kletzing

Institution: University of Iowa - Iowa City

Program: Small Explorers (SMEX), ≤ \$250 million



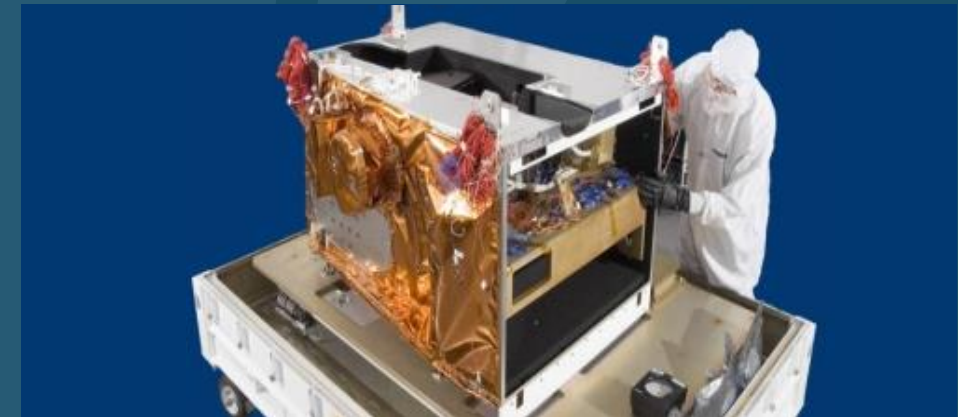
PI: Joseph Salisbury

Institution: University of New Hampshire, Durham

Program: Earth Venture, \leq \$250 million

EARTH VENTURE SELECTION:

Geosynchronous Littoral Imaging and Monitoring Radiometer (GLIMR) instrument



- Competitively selected from eight proposals under NASA's fifth Earth Venture Instrument solicitation, awarded \$107.9 million
- Opportunity for unique observations of ocean biology, chemistry, and ecology in Gulf of Mexico, portions of southeastern United States coastline, and Amazon River plume
- Helps protect ecosystem sustainability, improve resource management, and enhance economic activity



EXPLORATION



INNOVATION



EXCELLENCE

Artemis Phase 1: To the Lunar Surface by 2024

Artemis 1: First human spacecraft to the Moon in the 21st century

Artemis 2: First humans to the Moon in the 21st century

First high power Solar Electric Propulsion (SEP) system

First pressurized module delivered to Gateway

Artemis 3: Crewed mission to Gateway and lunar surface

Commercial Lunar Payload Services

- CLPS delivered science and technology payloads

Early South Pole Mission(s)

- First robotic landing on eventual human lunar return and ISRU site
- First ground truth of polar crater volatiles

Large-Scale Cargo Lander

- Increased capabilities for science and technology payloads

Humans on the Moon - 21st Century

First crew leverages infrastructure left behind by previous missions

As of July 2019

LUNAR SOUTH POLE TARGET SITE

2019

2024

Apollo 17

Retrieving Lunar Samples

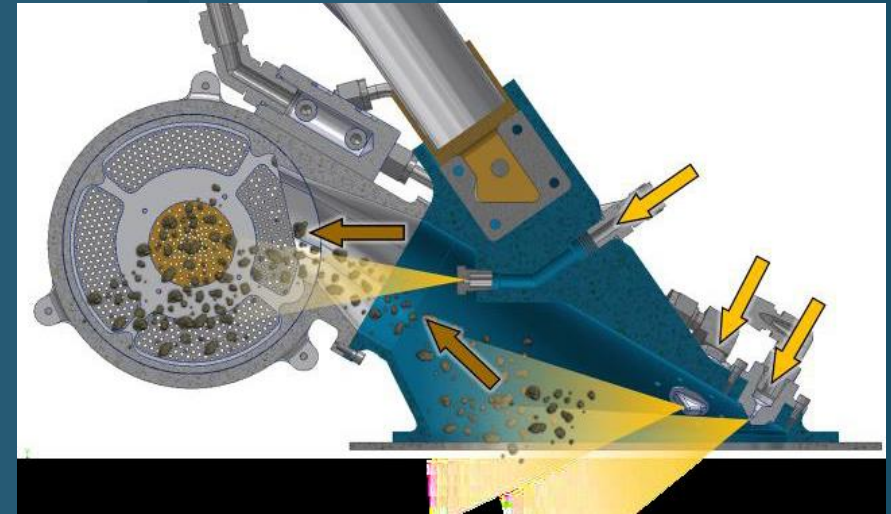
PI: Kris Zacny

Institution: Honeybee Robotics, Ltd

Program: Lunar Discovery and Exploration Program, ~ \$3 million

LUNAR PAYLOAD SELECTION:

PlanetVac: Sample Acquisition and Delivery System for Instruments and Sample Return



- Technology to acquire and transfer regolith from lunar surface to instruments
- Used for in-situ analysis or transfer to a sample-return container for sample return missions

InSight

Taking the 'Vital Signs' of Mars

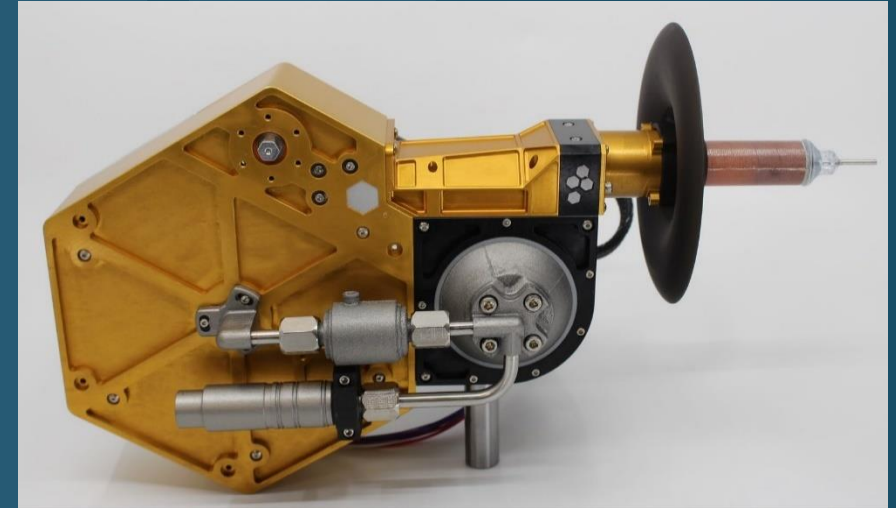
PI: Seiichi Nagihara

Institution: Texas Tech University

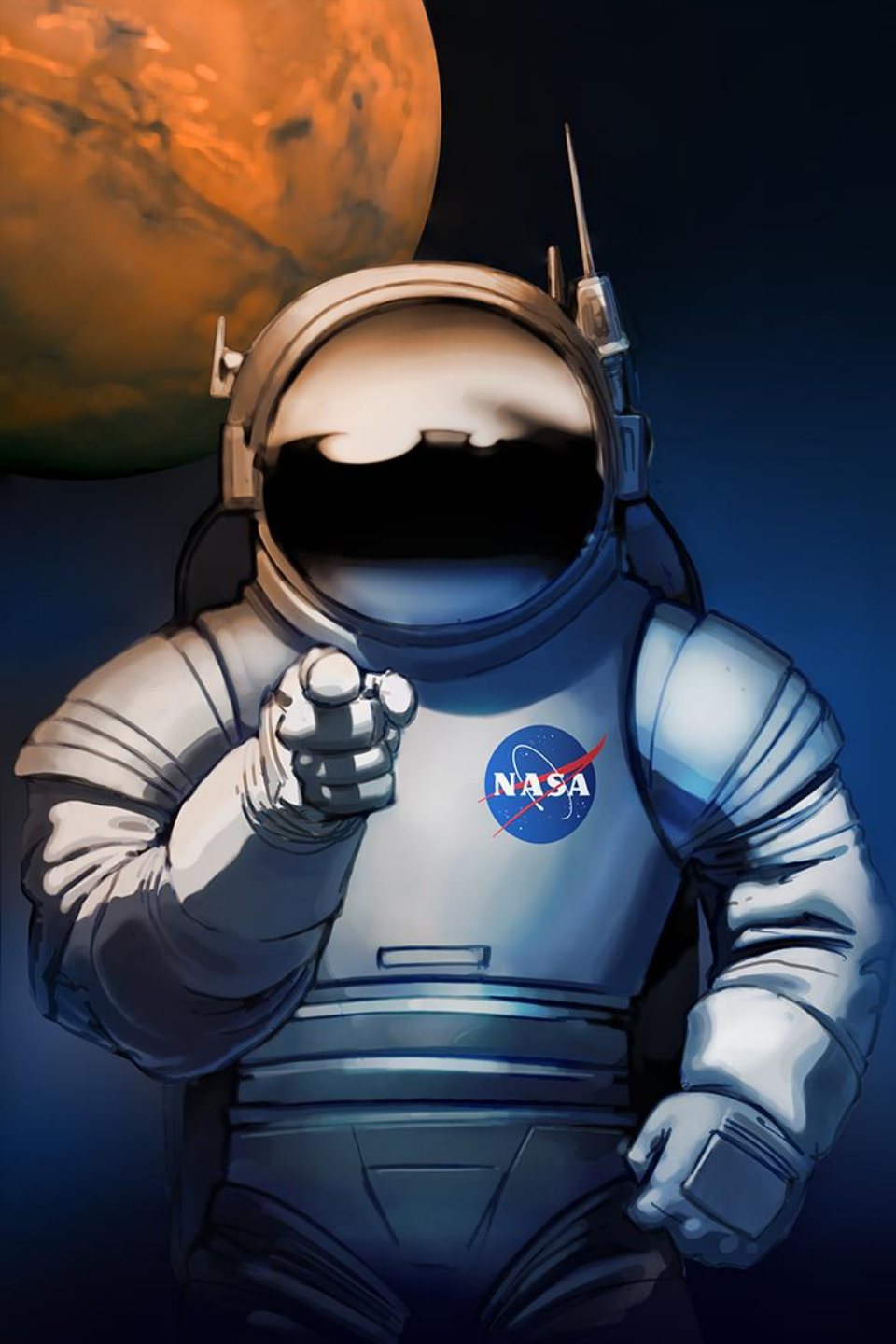
Program: Lunar Discovery and Exploration Program, ~ \$3 million

LUNAR PAYLOAD SELECTION:

Lunar Instrumentation For Subsurface Thermal Exploration with Rapidity (LISTER)



- Instrument designed to measure heat flow from interior of Moon
- Probe would penetrate 2-3 meters into lunar regolith using pneumatic drilling
- Measures the regolith's thermal gradient and thermal conductivity



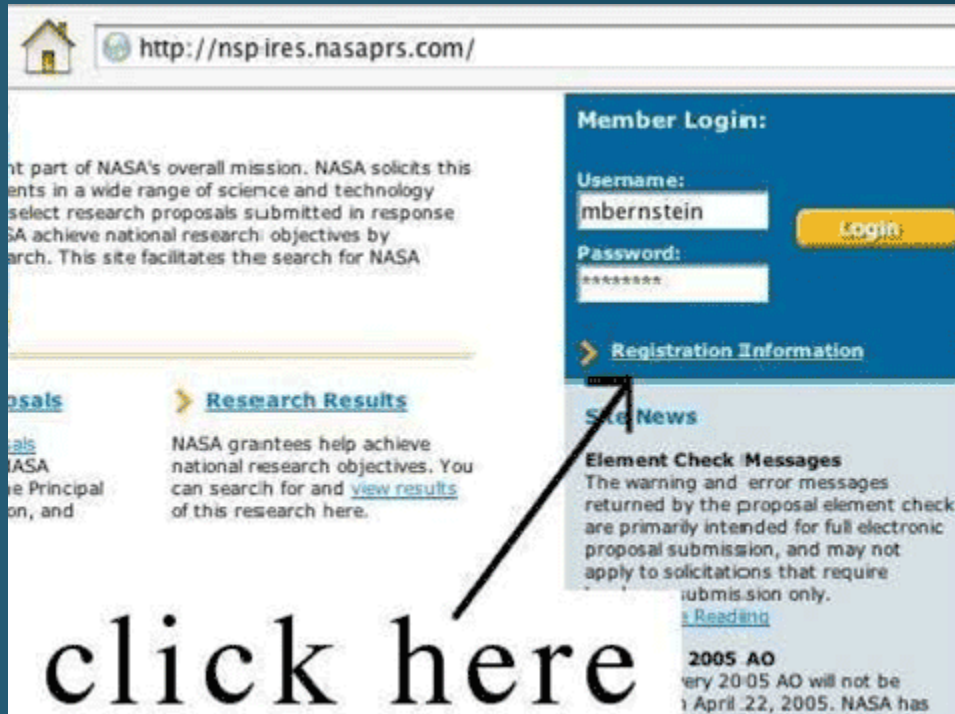
We Want YOU
To get Involved!



ROSES & You

- Research Opportunities in Space and Earth Science (ROSES), an omnibus solicitation for proposals
- Typically released on Valentine's Day, February 14
- Includes opportunities for Basic and Applied Research, Technology Development, Guest Investigator Programs, and Early Career Programs in support of NASA Science
- Contains many individual program elements, each with its own due date and topics
- Subscribe to NSPIRES RSS feed and mailing lists for updates, amendments, and clarifications to program elements
- ROSES How To Guide can be found at <https://science.nasa.gov/researchers/sara/how-to-guide>

NSPIRES



- NASA solicits research through the release of various research announcements in a wide range of science and technology disciplines
- All solicitations advertise and receive proposals through NSPIRES
- Learn about previous awardees and read successful abstracts
- Subscribe to NSPIRES to stay up-to-date on current and future opportunities
- Register and access NSPIRES here:
<http://nspires.nasaprs.com/>
- Additional information here:
<https://science.nasa.gov/researchers/sara/how-to-guide/nspires-registration>



Peer Review Panels

- NASA Science makes decisions based on competition and peer review
- Volunteering on a review panel is highly encouraged
 - Opportunity to learn how to write successful proposals
 - NASA provides honorarium for participants
- More information on how to volunteer here:
<https://science.nasa.gov/researchers/volunteer-review-panels>

NASA Science Planned Announcements of Opportunity

FY 2019 Planned

- Discovery (*Released*)
- Earth Venture Continuity-1 Missions of Opportunity (*Released*)
- Astrophysics Explorers (SMEX) and Missions of Opportunity (*Released*)
- Heliophysics Explorers (MIDEX), Q3
- Earth Venture Mission-3, Q4

FY 2020 Planned

- Earth Venture Instrument-6, Q3

FY 2021 Planned

- Astrophysics Explorers (MIDEX) and Missions of Opportunity, Q4

For most current target release dates of future solicitations, go to Science Office for Missions Assessments website, <https://soma.larc.nasa.gov/>

Stay up to date
with our RSS feed

Funding Opportunities: Grant Solicitations

- The 2019 version of Research Opportunities in Earth and Space Science (ROSES-19) has been posted at <http://solicitation.nasaprs.com/ROSES2019> on March 14, 2019.
- Table 2 with all program elements organized by due date may be found at <http://solicitation.nasaprs.com/ROSES2019table2>
- Table 3 with all program elements organized by subject matter may be found at <http://solicitation.nasaprs.com/ROSES2019table3>
- The FAQ on what's new in ROSES-2019 has been posted at <http://science.nasa.gov/researchers/sara/faqs/#1>
- We have a few ways for proposers to keep up to date with changes to ROSES-19. You may:
 - Subscribe to the SMD NSPIRES mailing lists (by logging in at <http://nspires.nasaprs.com/> and checking the appropriate boxes under Account Management and Email Subscriptions),
 - Sign up for the ROSES-2019 RSS feed for clarifications, corrections and amendments at <http://science.nasa.gov/researchers/sara/grant-solicitations/roses-2019/> and
 - Subscribe to the relevant ROSES-2019 due date Google calendars. Instructions have been posted at <https://science.nasa.gov/researchers/sara/library-and->

For Researchers

- > [Subscribe / Contact SARA](#)
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- > [Grant Solicitations](#)
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- > [Program Officers List](#)
- > [How To Guide](#)
- > [Letters from SARA](#)
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- > [Fellowship Opportunities](#)
- > [Volunteer for Review Panels](#)
- > [Suggest Reviewers for ROSES Science Proposals](#)

ROSES 2018

- Amendment 71: C.30 Planetary Mission Conce
- Amendment 70: Changes to C.31 KPLO PSP T
- Amendment 69: B.13 DRIVE Science Centers S
- C.15 Planetary Protection - Europa Lander Up
- Amendment 68: Second Exoplanets Research
- Amendment 67: New Opportunity in A.48 PAC
- Amendment 66: New Opportunity in A.5, Carb
- Amendment 65: New opportunity in C.31 KPLO
- Amendment 64: New Opportunity in C.30 Plan
- D.10 NuSTAR Cycle 5 Correction

Subscribe to the
NSPIRES mailing list

Volunteer to serve
on a review panel



EXPLORATION



INNOVATION



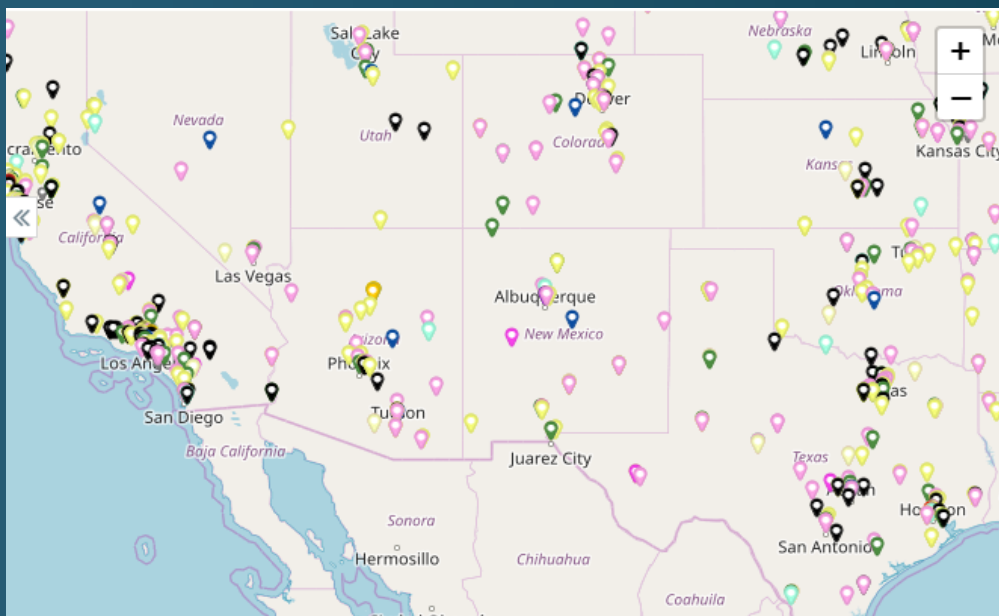
EXCELLENCE





Building Excellence

- Excellent teams bring diverse opinions and perspectives
- Teams must foster a community where everyone feels safe
- Encouraging healthy behavior through actions is paramount
- SMD is building excellent teams by:
 - Promoting diversity for both grants and PI-led missions
 - Providing resources to report concerns
 - Partnering with the Office of Diversity and Equal Opportunity
 - Examining barriers to diversity and inclusion within NASA and the broader science community



Science Activation Overview

- Leverage over 200 partnerships through network of science and community-based institutions using “multiplier effect” across U.S.
- Validate performance on each award using independent evaluators
- Utilize volunteer networks, such as Solar System Ambassadors and Night Sky Network, with over 1100 mobilized across U.S.
- For more about NASA Science Activation, go to: science.nasa.gov/learners
- For NASA Science in Spanish, go to: ciencia.nasa.gov

NASA Science innovates to inspire future leaders

Undergraduate and Graduate Research Opportunities

NASA Internships allow students to work directly with NASA. Many of these positions provide stipends and opportunities are available throughout the academic year. For more information, visit: <http://Intern.nasa.gov>

NASA's Summer Undergraduate Program for Planetary Research (SUPPR) is an eight-week summer internship that provides undergraduates the opportunity to participate in NASA planetary geosciences research under the direction of a NASA-sponsored investigator. For more information, visit: <https://www.lpi.usra.edu/suppr/>

NASA's Student Airborne Research Program (SARP) is an eight-week summer program for rising seniors to acquire hands-on research experience onboard NASA Earth-observing aircraft. For more information, visit: <https://airbornescience.nasa.gov>

Future Investigators in NASA Earth and Space Science and Technology (FINESST) invites proposals for graduate student-developed research or technology projects. For more information, visit: <http://solicitation.nasaprs.com/>

Post-Doc & Early Career Research Opportunities

The NASA Postdoctoral Program (NPP) offers fellowships to pursue research at NASA Centers or NASA-affiliated institutions. Although primarily for recent doctoral graduates, 'senior' NPP fellowships may also be awarded. For more information, visit: <https://npp.usra.edu>

NASA DEVELOP is a training program that allows recent graduate and early career professionals to apply NASA Earth observations to interdisciplinary projects involving government, nonprofits, and other organizations, while being mentored by NASA science advisors. For more information, visit: <https://develop.larc.nasa.gov>

The NASA Hubble Fellowship Program (NHFP) supports postdoctoral scientists to pursue independent research in any area of NASA Astrophysics, using theory, observation, experimentation, or instrumental development. For more information, visit: <http://nhfp.stsci.edu>

The Roman Technology Fellowship in Astrophysics provides early career researchers the opportunity to develop skills necessary to develop and lead astrophysics flight instruments/projects. For more information, visit: <https://science.nasa.gov/researchers/sara/fellowship-programs/nancy-grace-roman-technology-fellowships-astrophysics-early-career-researchers>

The New Investigator Program in Earth Science, Heliophysics Early Career Investigator Program, Early Career Award Program, and Early Career Fellowship Startup Program for Named Fellows support research and leadership development for early career scientists and engineers in these disciplines. Opportunities will be announced at <https://nspires.nasaprs.com/external>

Mission Principal Investigator Development

- Seek to increase the diversity of mission principal investigators and develop the next generation of mission leaders to ensure that new ideas and mission concepts are brought forward
- Based on feedback from November 2018 workshop, NASA Science
 - Developed a consolidated PI resources webpage at <https://science.nasa.gov/researchers/new-pi-resources>
 - Introduced a pre-reviews of mission peer review panels to ensure diversity and reduce conflicts of interest
 - Added a code of conduct requirement for SMD-funded conferences to ROSES 2019
 - Restarted proposal writing workshops at major science conferences
 - Included career development positions and associated evaluation criteria as part Discovery and New Frontiers AOs
 - Lessons learned presentation on characteristics and key mistakes associated with proposal success
 - Video: <https://www.youtube.com/watch?v=xoLYRjm48-U>
- Upcoming activities include:
 - Information sessions at science conferences and stand-alone workshops to support people developing first proposal
 - First workshop will be held October 16-18, 2019 in Tucson, AZ and information on how to register will be forthcoming
 - Sign up to learn more at <https://lists.hq.nasa.gov/mailman/listinfo/hq-smdpi-workshop-outreach>



Get Involved!

- NASA Solicitation Website:
<https://nspires.nasaprs.com/external/>
- Research Resources:
<https://science.nasa.gov/researchers>
- Review Panel Volunteers:
<https://science.nasa.gov/researchers/volunteer-review-panels>
- Technology Resources:
<https://science.nasa.gov/technology>
- Flight Mission Resources: <https://soma.larc.nasa.gov>
- Student Resources:
<https://science.nasa.gov/learners/learner-opportunities>
- Summer Internships: <https://intern.nasa.gov>



EXPLORE
with us